

**Abstract for LTD-7, contributed talk on mass spectrometry**

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**HIGH-MASS BIOMOLECULE MASS SPECTROMETRY WITH CRYOGENIC DETECTORS**

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We present experimental results obtained using a cryogenically-cooled Nb-Al<sub>2</sub>O<sub>3</sub>-Nb superconducting tunnel junction (STJ) detector operating at 1.3 K as an ion detector in a time-of-flight mass spectrometer. As opposed to microchannel plate ion detectors (MCPs) commonly used in such systems, cryogenic detectors such as STJs offer a near 100 % detection efficiency for all ions including very massive, slow moving macromolecules. In our experimental setup a STJ detector was mounted next to an MCP in a matrix-assisted laser desorption/ionization (MALDI) time-of-flight mass spectrometer. Deflection plates in the flight tube provided a way to aim ions alternatively at either detector so that the detector signals could be compared. We will present results of a direct comparison between these detector types for a range of ion masses.

Our experimental results also show that the energy-resolving capability of the STJ detector can be used for charge-discrimination – a feature not available with MCPs. The STJ detector produces pulses whose heights are approximately proportional to ion energy, thus the height of a pulse generated by the impact of a doubly-charged ion is about twice the height of a singly-charged ion pulse.

We also present the first results from a study of DNA repair proteins with mass spectrometry using STJ detectors and show how the high efficiency of STJ detectors for high-mass biomolecular ions can help to solve problems in structural biology.

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